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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/078,601	02/19/2002	Xiaoming Ren	107044-0013	5541

24267 7590 06/27/2005

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EXAMINER	
ALEJANDRO, RAYMOND	

ART UNIT	PAPER NUMBER
1745	

DATE MAILED: 06/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/078,601	REN ET AL.	
	Examiner	Art Unit	
	Raymond Alejandro	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 April 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *37-102* is/are pending in the application.

4a) Of the above claim(s) *47-54,59-61,64,67,74-95 and 100* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *37-46,55-58,62,63,65,66,68-73,96-99,101 and 102* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 September 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

This final office action is in reply to the amendment dated 04/21/05. The applicants have overcome the objection, the 35 USC 112 rejection and the 35 USC 102 rejection. Refer to the abovementioned amendment for more details on applicant's rebuttal arguments. However, the present claims are finally rejected over new art as seen hereinafter and for the reasons of record:

Election/Restrictions

1. This application contains claim 47-54, 59-61, 64, 67, 74-95 and 100 drawn to an invention nonelected with traverse in Paper No. 12/18/03 and by original presentation as indicated in the prior office action of 01/25/05. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

Double Patenting

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 37, 44-46, 55, 62, 96-99 and 101-102 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 16 of copending Application No. 10/870570 (*US Patent Application Publication 2004/0265680*). Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

The copending application'570 claims the following (CLAIM 16):

16. A direct oxidation fuel cell, comprising:

(A) a membrane electrode assembly, including:

(i) a protonically conductive, electronically non-conductive membrane electrolyte, having an anode face and an opposing cathode face; and

(ii) a catalyst coating disposed on each of said anode face and said cathode face, whereby electricity-generating reactions occur upon introduction of fuel solution from an associated fuel source, including anodic dissociation of said fuel solution into carbon dioxide, protons and electrons, and cathodic combination of protons, electrons and oxygen from an associated source of oxygen, producing water;

(B) an anodic diffusion layer disposed in intimate contact with said anode face of said membrane electrode assembly, and having a plurality of openings therein to allow said associated fuel mixture to pass through to said anode face as fuel is consumed at said anode;

(C) a cathodic diffusion layer disposed in intimate contact with said cathode face of said membrane electrode assembly and having a plurality of openings therein to allow oxygen to pass through to said cathode face of said membrane electrode assembly; and

(D) a gas permeable, fluid impermeable membrane disposed generally parallel to said anodic diffusion layer, such that said fuel solution can pass between said anodic diffusion layer and said gas permeable membrane to separate carbon dioxide that is released at said anode face and to vent carbon dioxide from said fuel cell, whereby carbon dioxide is removed from said fuel cell without active transport mechanisms.

It is noted that the gas permeable, fluid impermeable membrane disposed in the anodic side provides the necessary functional interrelationship to vent gaseous product without allowing liquid fuel to exit through anode chamber. Therefore, it is noted that claim 16 of the copending

application'570 fully encompasses the claimed subject matter as recited in claims 37, 44-46, 55, 62, 96-99 and 101-102.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

4. Claims 37, 44-46, 55, 62, 96-99 and 101-102 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 16 of copending Application No. 11/082306. Although the conflicting claims are not identical, they are not patentably distinct from each other because of the following reasons:

The copending application'306 claims the following (CLAIM 16):

16. A direct oxidation fuel cell, comprising:
(A) a membrane electrode assembly, including:
(i) a protonically conductive, electronically non-conductive membrane electrolyte, having an anode face and an opposing cathode face; and
(ii) a catalyst coating disposed on each of said anode face and said cathode face, whereby electricity-generating reactions occur upon introduction of fuel solution from an associated fuel source, including anodic dissociation of said fuel solution into carbon dioxide, protons and electrons, and cathodic combination of protons, electrons and oxygen from an associated source of oxygen, producing water;
(B) an anodic diffusion layer disposed in intimate contact with said anode face of said membrane electrode assembly, and having a plurality of openings therein to allow said associated fuel mixture to pass through to said anode face as fuel is consumed at said anode
(C) a cathodic diffusion layer disposed in intimate contact with said cathode face of said membrane electrode assembly and having a plurality of openings therein to allow oxygen to pass through to said cathode face of said membrane electrode assembly; and
(D) a gas permeable, fluid impermeable membrane disposed generally parallel to said anodic diffusion layer, such that said fuel solution can pass between said anodic diffusion layer and said gas permeable membrane to separate carbon dioxide that is released at said anode face and to vent carbon dioxide from said fuel cell, whereby carbon dioxide is removed from said fuel cell without active transport mechanisms.

Again, it is noted that the gas permeable, fluid impermeable membrane disposed in the anodic side provides the necessary functional interrelationship to vent gaseous product without

allowing liquid fuel to exit through anode chamber. Therefore, it is noted that claim 16 of the copending application'306 fully encompasses the claimed subject matter as recited in claims 37, 44-46, 55, 62, 96-99 and 101-102.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 37-46, 55-58, 62, 63, 65, 66, 68-73, 96-99 and 101-102 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corey et al 2002/0172851 in view of Watanabe et al 4931168.

The present claims are drawn to a direct oxidation fuel cell wherein the claimed inventive concept comprises the specific anode chamber configuration and gas effluent release port.

With respect to claim 37, 44-46, 55-56, 62-63, 96-99 and 101-102:

Corey et al disclose a direct oxidation fuel cell system 20 (DMFC) including a membrane electrolyte assembly 22 having a proton-conducting, electronically non-conductive membrane electrolyte 26 disposed between an anode chamber 22 and a cathode chamber 24 (SECTION 0039). Each surface of the membrane electrolyte 26 is coated with electrocatalysts which serve as anode reactive sites 23 on the anode chamber side of the membrane and cathode reactive sites

25 on the cathode chamber side of the membrane, thereby, facilitating the electrochemical reactions of the DMFC (SECTION 0039). *It is noted that the membrane electrolyte 26 may act as the specific gas-permeable, liquid impermeable layer coupled to the anode diffusion layer.*

Diffusion layers 27 and 28 may be included and positioned on either side of the membrane and provide a uniform effective supply of methanol solution to the anode reactive sites (SECTION 0041). It is disclosed that fuel cells generate electricity through electrochemical reactions (SECTION 0004) and they have a circuit connecting the anode chamber and the cathode chamber through an external electrical load (SECTION 0009 & 0043). Corey et al also disclose that the effluents could be removed by venting the carbon dioxide out of the anode chamber (SECTION 0014). *Thus, Corey et al clearly envisage having the gaseous effluent generated in the anode portion of the fuel cell vented out of the anode portion and into the surrounding atmosphere.*

Corey et al further disclose, *in particular*: that the effluents could be removed by venting the carbon dioxide out of the anode chamber (SECTION 0014); as well as an effluent gas produced in an anode chamber of a fuel cell is collector and then exhausted through a cathode chamber of the fuel cell (SECTION 0020); having the carbon dioxide produced from the oxidation of fuels not directly exhausted from the fuel cell system but, instead, used to remove/recirculate effluent water in the cathode (SECTION 0017); and the fuel cell including a proton conducting membrane electrolyte separating the chambers and having an effluent gas-permeable portion allowing effluent gas produced in said anode chamber to flow into the cathode chamber (SECTION 0026). *Thus, Corey et al clearly envisage having the gaseous effluent*

generated in the anode portion of the fuel cell vented out of the anode portion and into the surrounding atmosphere.

Figure 5 below depicts a passive control system using gas produced in the anode chamber for removing water from the reactive sites in the cathode chamber (SECTION 0085) wherein the CO2 is vented out or released to the ambient environment (FIGURE 5).

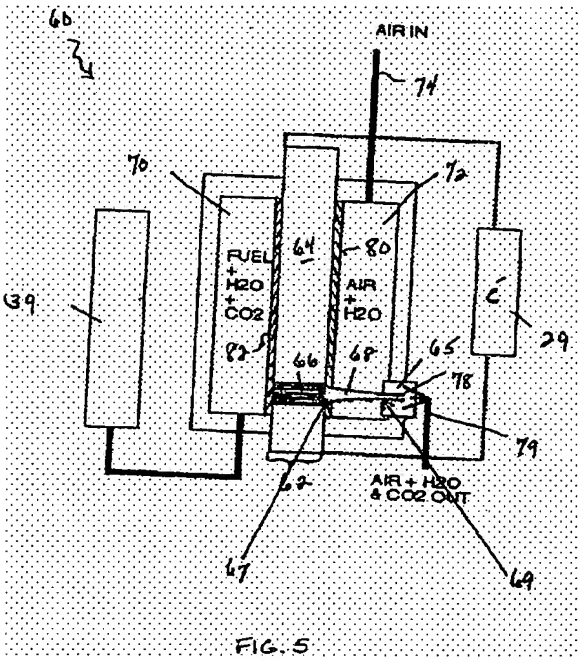


FIG. 5

As apparent from Figure 5 and Corey et al's disclosure of SECTIONS 0014, 0017 and 0020), this fuel cell system: i) can be provided with a gaseous effluent port located in the anode chamber in close proximity to the anode side of the membrane electrolyte; and ii) does not have any liquid exit port in the anode chamber per se. Thus, it has a liquid closed volume anode chamber, and no anode liquid recirculation. These features act as a gaseous anodic product removal component. This structure also encompasses the absence of any water external pumping and/or active water removal element.

As previously mentioned, the fuel cell system of **Figure 5** above represents a *passive* fuel cell system (SECTION 0085). *Thus, it operates without external pumping of cathodically-generated water and without active water removal elements.*

With respect to claims 38-39, 57-58, 68-71, 96-99 and 101-102:

Corey et al teach the use of methanol (SECTIONS 0007, 0009, 0011) as well as the addition of another liquid such as water (SECTION 0009, 0041, 0043 & FIGURE 5). It is also disclosed that in a DMFC system, an aqueous methanol solution, preferably a solution greater than 0 to about 100 % methanol by volume can be used (SECTION 0043). *Hence, Corey et al at once envisage the use of: a) aqueous methanol solutions, b) 100 % methanol by volume per se and 3) aqueous methanol solution wherein the concentration of methanol is greater than 50 % by volume.*

With respect to claim 38 and 40:

As apparent from Figure 5 and Corey et al's disclosure of SECTIONS 0014, 0017 and 0020 and 0026, this fuel cell system: i) can be provided with a gaseous effluent port located in the anode chamber in close proximity to the anode side of the membrane electrolyte; and ii) does not have any liquid exit port in the anode chamber per se. Thus, it does have a liquid closed volume anode chamber, and no anode liquid recirculation.

With respect to claims 41 and 43:

Corey et al disclose that the carbon dioxide produced from the oxidation of fuels is not directly exhausted from the fuel cell system but, instead, used to remove/recirculate effluent water in the cathode (SECTION 0017); and the fuel cell including a proton conducting membrane electrolyte separating the chambers and having an effluent gas-permeable portion

allowing effluent gas produced in said anode chamber to flow into the cathode chamber (SECTION 0026). *Thus, this implies that the water produced at the cathode is not collected or redirected to the anode, in fact, the anode effluent is being employed to remove such water out of the fuel cell system. Thus, a portion of the anode chamber is gas permeable.*

With respect to claims 42-43:

Corey et al further disclose that the effluents could be removed by venting the carbon dioxide out of the anode chamber (SECTION 0014);

With respect to claim 65:

Reference numeral 39 is a fuel supply cartridge and represents the external fuel source (SECTION 0080).

With respect to claims 66 and 72-73:

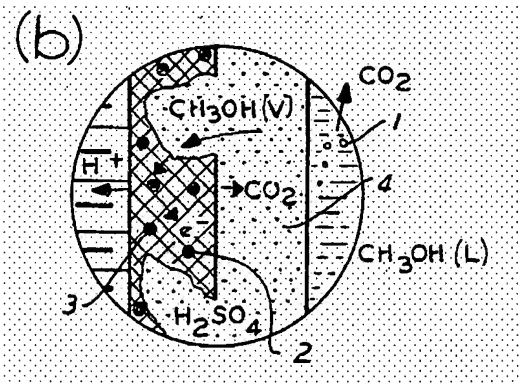
It is disclosed the establishment of low pressure regions adjacent the outlet in the anode chamber (SECTION 0026, 0088). *Thus, a pressure differential does exist between the fuel in the fuel source and the anode chamber. Accordingly, it is noted that this pressure differential effectively creates suction conditions in the anode chamber.*

Corey et al disclose a direct oxidation fuel cell according to the description presented above. However, the preceding prior art does not expressly disclose the specific gaseous effluent port to vent gaseous product from the anode chamber.

Watanabe et al disclose a gas permeable electrode (TITLE) for a methanol fuel cell (COL 1, line 7-15) wherein the gas permeable electrode comprises a gas permeable layer and a reaction layer comprising hydrophobic portions and hydrophilic portions wherein electrolyte penetrates into the reaction layer and does not penetrate into the gas permeable layer (ABSTRACT/COL 6,

lines 36-46); and only the gas produced on the electrode and the gas supplied penetrate into the gas permeable layer; the gas can be released from the rear side of the electrode and the reaction surface thereof is never covered with the gas (ABSTRACT/COL 6, lines 36-46). In particular, Watanabe et al teach that the carbon dioxide produced (*the product of the electrochemical reaction*) is dissolved into the electrolytes; and since the hydrophilic apertures are extremely fine and in proximity, the carbon dioxide produced evaporates into the hydrophobic fine apertures before supersaturation thereof in the electrolyte where gases produced which reach that rear side of the electrode through the passage in the reverse direction of the methanol passage and is released (COL 6, lines 54-65).

- **Figure 2b** below illustrates the gas permeable embodiment of the electrode:



Based on the aforementioned, it would have been obvious to one skilled in the art at the time the invention was made to use the specific gaseous effluent port to vent gaseous product from the anode chamber of Watanabe et al in the direct oxidation fuel cell of Corey et al as Watanabe et al teach that such specific gas effluent port feature of the gas permeable electrode allows to effectively release gas produced from the reaction by avoiding its contact with the reaction surface of the electrode. Thus, the reaction characteristic of the fuel cell is improved. Additionally, Watanabe et al teaches that it reduces potential of the electrolytic material.

7. Claims 37-46, 55-58, 62, 63, 65, 66, 68-73, 96-99 and 101-102 are rejected under 35 U.S.C. 103(a) as being unpatentable over Corey et al 2002/0172851 in view of applicant's admission of prior art (herein called "*the admitted art*") [***Refer to page 10, 1st full paragraph of the specification***].

The present claims are drawn to a direct oxidation fuel cell wherein the claimed inventive concept comprises the specific anode chamber configuration and gas effluent release port.

With respect to claim 37, 44-46, 55-56, 62-63, 96-99 and 101-102:

Corey et al disclose a direct oxidation fuel cell system 20 (DMFC) including a membrane electrolyte assembly 22 having a proton-conducting, electronically non-conductive membrane electrolyte 26 disposed between an anode chamber 22 and a cathode chamber 24 (SECTION 0039). Each surface of the membrane electrolyte 26 is coated with electrocatalysts which serve as anode reactive sites 23 on the anode chamber side of the membrane and cathode reactive sites 25 on the cathode chamber side of the membrane, thereby, facilitating the electrochemical reactions of the DMFC (SECTION 0039). *It is noted that the membrane electrolyte 26 may act as the specific gas-permeable, liquid impermeable layer coupled to the anode diffusion layer.*

Diffusion layers 27 and 28 may be included and positioned on either side of the membrane and provide a uniform effective supply of methanol solution to the anode reactive sites (SECTION 0041). It is disclosed that fuel cells generate electricity through electrochemical reactions (SECTION 0004) and they have a circuit connecting the anode chamber and the cathode chamber through an external electrical load (SECTION 0009 & 0043). Corey et al also disclose that the effluents could be removed by venting the carbon dioxide out of the anode chamber (SECTION 0014). *Thus, Corey et al clearly envisage having the gaseous effluent*

generated in the anode portion of the fuel cell vented out of the anode portion and into the surrounding atmosphere.

Corey et al further disclose, *in particular*: that the effluents could be removed by venting the carbon dioxide out of the anode chamber (SECTION 0014); as well as an effluent gas produced in an anode chamber of a fuel cell is collector and then exhausted through a cathode chamber of the fuel cell (SECTION 0020); having the carbon dioxide produced from the oxidation of fuels not directly exhausted from the fuel cell system but, instead, used to remove/recirculate effluent water in the cathode (SECTION 0017); and the fuel cell including a proton conducting membrane electrolyte separating the chambers and having an effluent gas-permeable portion allowing effluent gas produced in said anode chamber to flow into the cathode chamber (SECTION 0026). *Thus, Corey et al clearly envisage having the gaseous effluent generated in the anode portion of the fuel cell vented out of the anode portion and into the surrounding atmosphere.*

Figure 5 below depicts a passive control system using gas produced in the anode chamber for removing water from the reactive sites in the cathode chamber (SECTION 0085) wherein the CO2 is vented out or released to the ambient environment (FIGURE 5).

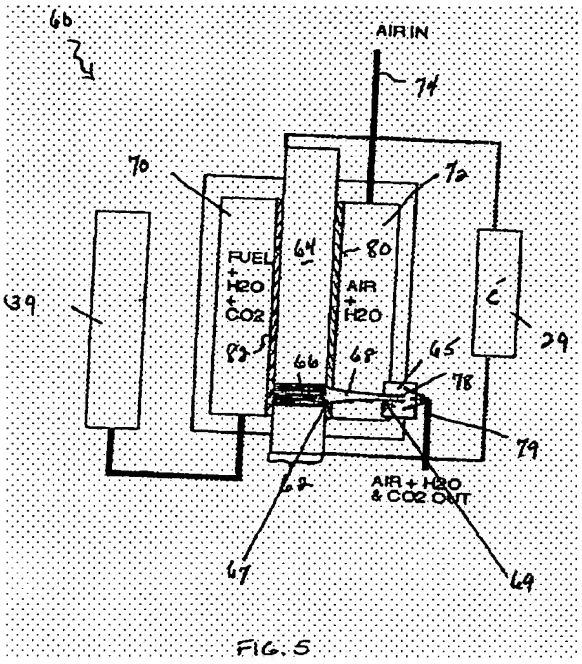


FIG. 5

As apparent from Figure 5 and Corey et al's disclosure of SECTIONS 0014, 0017 and 0020), this fuel cell system: i) can be provided with a gaseous effluent port located in the anode chamber in close proximity to the anode side of the membrane electrolyte; and ii) does not have any liquid exit port in the anode chamber per se. Thus, it has a liquid closed volume anode chamber, and no anode liquid recirculation. These features act as a gaseous anodic product removal component. This structure also encompasses the absence of any water external pumping and/or active water removal element.

As previously mentioned, the fuel cell system of **Figure 5** above represents a *passive* fuel cell system (SECTION 0085). *Thus, it operates without external pumping of cathodically-generated water and without active water removal elements.*

With respect to claims 38-39, 57-58, 68-71, 96-99 and 101-102:

Corey et al teach the use of methanol (SECTIONS 0007, 0009, 0011) as well as the addition of another liquid such as water (SECTION 0009, 0041, 0043 & FIGURE 5). It is also

disclosed that in a DMFC system, an aqueous methanol solution, preferably a solution greater than 0 to about 100 % methanol by volume can be used (SECTION 0043). *Hence, Corey et al at once envisage the use of: a) aqueous methanol solutions, b) 100 % methanol by volume per se and 3) aqueous methanol solution wherein the concentration of methanol is greater than 50 % by volume.*

With respect to claim 38 and 40:

As apparent from Figure 5 and Corey et al's disclosure of SECTIONS 0014, 0017 and 0020 and 0026, this fuel cell system: i) can be provided with a gaseous effluent port located in the anode chamber in close proximity to the anode side of the membrane electrolyte; and ii) does not have any liquid exit port in the anode chamber per se. Thus, it does have a liquid closed volume anode chamber, and no anode liquid recirculation.

With respect to claims 41 and 43:

Corey et al disclose that the carbon dioxide produced from the oxidation of fuels is not directly exhausted from the fuel cell system but, instead, used to remove/recirculate effluent water in the cathode (SECTION 0017); and the fuel cell including a proton conducting membrane electrolyte separating the chambers and having an effluent gas-permeable portion allowing effluent gas produced in said anode chamber to flow into the cathode chamber (SECTION 0026). *Thus, this implies that the water produced at the cathode is not collected or redirected to the anode, in fact, the anode effluent is being employed to remove such water out of the fuel cell system. Thus, a portion of the anode chamber is gas permeable.*

With respect to claims 42-43:

Corey et al further disclose that the effluents could be removed by venting the carbon dioxide out of the anode chamber (SECTION 0014);

With respect to claim 65:

Reference numeral 39 is a fuel supply cartridge and represents the external fuel source (SECTION 0080).

With respect to claims 66 and 72-73:

It is disclosed the establishment of low pressure regions adjacent the outlet in the anode chamber (SECTION 0026, 0088). *Thus, a pressure differential does exist between the fuel in the fuel source and the anode chamber. Accordingly, it is noted that this pressure differential effectively creates suction conditions in the anode chamber.*

Corey et al disclose a direct oxidation fuel cell according to the description presented above. However, the preceding prior art does not expressly disclose the specific gaseous effluent port to vent gaseous product from the anode chamber.

The admitted art teaches that prior systems, such as those set forth in Fig. 1 separate carbon dioxide produced in the anodic reaction out of the system to ambient air by, *inter alia*, allowing the carbon dioxide to be vented passively directly to the ambient environment at a vent located outside the fuel cell anode chamber (See page 10, 1st full paragraph of the specification).

In light of the foregoing prior admission, it would have been obvious to one skilled in the art at the time the invention was made to use the specific gaseous effluent port to vent gaseous product from the anode chamber of the admitted art in the direct oxidation fuel cell of Corey et al as the admitted art clearly teaches that as will be understood by those skilled in the art direct methanol fuel cells produced liquid water at the cathode and gaseous carbon dioxide at the anode

as chemical products of the reaction and prior systems, *in a conventional manner*, has separated carbon dioxide produced in the anodic reaction out of the system to ambient air by allowing the carbon dioxide to be vented passively directly to the ambient environment at a vent located outside the fuel cell anode chamber. Thus, the admitted art clearly instructs those of ordinary skill in the art to dispose reaction products (i.e. the carbon dioxide) as instantly claimed; and consequently, the inventive scope of the admitted art immediately envisages using such venting techniques in fuel cell arrangements.

Response to Arguments

8. Applicant's arguments, filed on 04/21/05, with respect to foregoing claims have been considered but are moot in view of the new ground(s) of rejection.

9. The following response to arguments already addressed previous applicant's arguments and was presented in the prior office action of 01/25/05. However, in the event that applicant decides to further re-argue any of the previously presented arguments, applicant is herein advised that the examiner's response to arguments will be reinstated.

10. Throughout the entire remark section of the aforementioned amendment, the applicants have strenuously contended that the prior art of record does not teach the following: *a) "having a dead-ended anode chamber that does not require a recirculation loop"; b) "to manage the release of carbon dioxide"; c) "a closed volume dead-ended anode chamber that does not require pumps and a re-circulation loops"; d) "The release of carbon dioxide is discussed as one of the objects of the invention"; e) "the carbon dioxide is vented out of the system without having to circulate the fuel solution in which carbon dioxide is contained"; f) "passive selective*

venting of carbon dioxide"; g) "that carbon dioxide is effectively released from the gaseous effluent release port"; h) "venting or release of carbon dioxide directly from the anode aspect of the fuel cell to the ambient environment"; i) "the carbon dioxide is released to the environment through the gaseous effluent release port....and away from the membrane electrode assembly"; j) "These gas permeable portions allow gaseous carbon dioxide to be removed from the fuel cell"; k) "allow the carbon dioxide to escape directly to the ambient environment from the anode chamber"; l) "the importance of removal of carbon dioxide" and the like. Yet again, the examiner points out that the present claim language is not commensurate in scope with applicants' arguments. That is to say, the present claims are completely silent as to: i) venting/releasing CO_2 generated in the anodic reaction out of the anode chamber. Nowhere in the present claims the examiner can find that CO_2 is released from or vented out of the anode chamber and its implication of assisting in efficient fuel management or delivery, avoiding the need for pumping/valving the CO_2 or the need to recirculate unreacted fuel back into the fuel cell and the like.

11. Moreover, the examiner recognizes that the applicant is entitled to claim the intended invention as broad as possible but then, at the same time, the examiner is entitled to give the claim language its broadest reasonable interpretation. Having said that, the examiner wishes to indicate that the present claim language simply recites: a) "(claim 37) *at least one open gaseous effluent release port which is in substantially direct gaseous communication with the ambient environment allowing effective release of anodically-generated gaseous effluent from said fuel cell as said gaseous effluent is generated*"; b) "(claim 44) *a gaseous anodic product removal component disposed between said catalyzed membrane electrolyte and at least a portion of the*

interior wall of the anode chamber for effective release of anodically-generated gaseous effluent directly to the ambient environment"; c) "(claim 45) *at least one open gaseous effluent release port located in said anode chamber in close proximity to said anode aspect of the catalyzed membrane electrolyte which is in substantially direct gaseous communication with the ambient environment and through which anodically generated gaseous effluent is allowed to be released from said fuel cell housing*"; d) "(claim 46) *means for outporting gasses away from the anode aspect of the fuel cell substantially directly to the ambient environment which means for outporting gasses is disposed in close proximity to said anode aspect of the catalyzed membrane electrolyte assembly*"; e) "(claim 55) *a gas-permeable, liquid-impermeable layer for releasing gaseous anodic product coupled in proximity to said anode diffusion layer*"; f) "(claim 56) *a gas-permeable, liquid-impermeable layer for releasing gaseous anodic product coupled in proximity to said anode diffusion layer*"; g) "(claim 62) *an element disposed between said fuel source and said anode aspect of the direct oxidation fuel cell for controlling the delivery of fuel to the anode aspect of the membrane electrolyte*". In view of that and given that the prior art of record clearly teaches: that the effluents could be removed by venting the carbon dioxide out of the anode chamber (Corey et al SECTION 0014); as well as an effluent gas produced in an anode chamber of a fuel cell is collector and then exhausted through a cathode chamber of the fuel cell (Corey et al SECTION 0020); having the carbon dioxide produced from the oxidation of fuels not directly exhausted from the fuel cell system but, instead, used to remove/recirculate effluent water in the cathode (Corey et al SECTION 0017); and the fuel cell including a proton conducting membrane electrolyte separating the chambers and having an effluent gas-permeable portion allowing effluent gas produced in said anode chamber to flow into the cathode chamber

(Corey et al SECTION 0026); in addition, Figure 5 clearly illustrates the CO2 being vented out or released to the ambient environment:

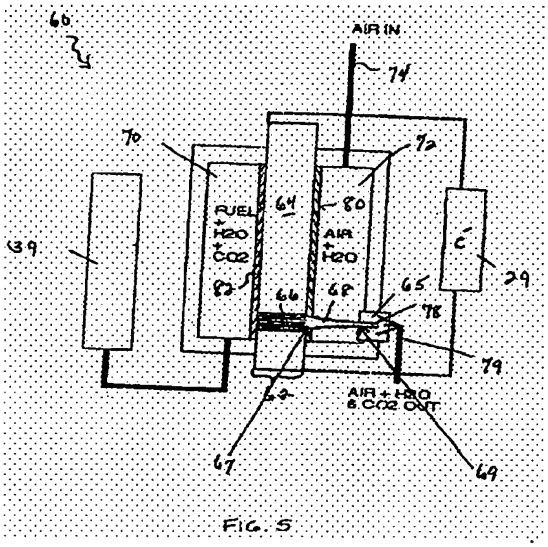


FIG. 5

thus, Corey et al clearly envisage having the gaseous effluent generated in the anode portion of the fuel cell vented out of the anode portion and into the surrounding ambient atmosphere; and having a delivery element for feeding fuel into the anode aspect of the membrane electrolyte. As apparent from Figure 5 and Corey et al's disclosure of SECTIONS 0014, 0017 and 0020), this fuel cell system: i) can be provided with a gaseous effluent port located in the anode chamber in close proximity to the anode side of the membrane electrolyte; and ii) does not have any liquid exit port in the anode chamber per se. Thus, it has a liquid closed volume anode chamber, and no anode liquid recirculation. These features act as a gaseous anodic product removal component. This structure also encompasses the absence of any water external pumping and/or active water removal element. Hence, it is emphatically asserted that the prior art of record still provides both the necessary functional and structural interrelationship to satisfy the claimed requirement.

12. Furthermore, the fact that the claim language recites that "*anodically-generated gaseous effluent*" or "*gases*" or "*gaseous anodic product*" does not mean that such gaseous effluent is

only CO_2. It broadly refers to any gaseous product. Additionally, the claim language "*the effluent release port is in substantially direct gaseous communication with the ambient environment*" does not necessarily imply that gas venting or releasing cannot occur through the electrolyte membrane and subsequently through the cathode (which is also in close proximity thereto) as disclosed by Corey et al. That is to say, the claim language just requires releasing any gaseous product effluent from the fuel cell or the anode chamber but it does not positively set forth that gas cannot be released through the electrolyte membrane and cathode as disclosed in the prior art. It just implies that the fuel cell structure is able to release gaseous effluent no matter how the gaseous effluent is released therefrom. That's why it is believed that the prior art of record still provides the necessary functional relationship of effectively releasing anodically-generated gaseous effluent.

13. Now, with respect to the specific assertion that the prior art does not disclose venting CO_2 out of the anode chamber, the examiner wishes to contend that the prior art clearly discloses that the effluents could be removed by venting the carbon dioxide out of the anode chamber (Refer to Corey et al, SECTION 0014 and Figure 5) (*and as admitted by the applicants, see the amendment of 09/01/04, at page 18, 1st full paragraph and paragraph bridging pages 18-19*). Thus, Corey et al clearly envisage and directly teach having the gaseous effluent generated in the anode portion of the fuel cell vented out of the anode portion and into the surrounding atmosphere through the cathode chamber. Thus, this assertion is not well-placed as the prior art clearly teaches venting the generated CO_2 gas. In view of the broad claim language, it is still not understood why applicants have taken the position of contending that the prior art fails to

disclose the foregoing limitations when in fact and without a reasonably doubt the prior art teaches to do so.

14. As to the allegation that "Applicant's invention is a simplified system that promotes fuel efficiency by venting CO2 substantially directly to the ambient environment, and not through the cathode chamber, and it does not include fluidic communication for delivering anodically-generated CO2 from the anode chamber to the cathode chamber" (refers to remarks of the amendment of 09/01/04), again, it is noted that the claim language does not set forth or, at least suggest, the necessary functional and structural interrelationship to satisfy the requirement argued by the applicants. Thus, the above-mentioned features upon which applicant relies are not recited in the rejected claims. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See In re Van Geuns, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). In addition, it is further pointed out the present claim language also reads on having the generated CO_2 vented out of the anode chamber through the cathode chamber as no CO_2 gas fluid restriction has been indicated in the present claims.

15. In response to applicant's argument that: a) "Corey, in the ordinary course of fuel cell operation, directs anodically generated carbon dioxide through a feature in a modified cell membrane and through the cathode chamber"; b) "using an unmodified membrane electrolyte would not be an effective way to encourage or manage release of the carbon dioxide out of the cell"; c) "the Corey system manages carbon dioxide by routing it through a feature in a modified membrane electrolyte and next through the cathode chamber targeting removal of excess water in the cathode chamber of the fuel cell.....this approach requires a specialized modification of the

cell membrane electrolyte or addition of a feature to the membrane electrolyte assembly...", the fact that applicant has recognized another advantage/disadvantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See Ex parte Obiaya, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

16. Regarding the requirement of having "a gas permeable, liquid impermeable layer coupled to the anode diffusion layer", the examiner also likes to state that the membrane electrolyte 26 per se may act as the specific gas-permeable, liquid impermeable layer coupled to the anode diffusion layer as Corey et al (*and as admitted by the applicants*) address the issue of allowing the passage of CO_2 from the anode chamber to the cathode chamber which are physically separated from one another by the membrane electrolyte 26. Consequently, the membrane electrolyte 26 exhibits gas permeability characteristics. Absent any further specific structural relationship between the anode layer and the gas-permeable liquid-impermeable layer (*e.g. specific placement, positioning, etc*), the examiner respectfully submits that the membrane electrolyte 26 does meet the requisite of the claimed limitation.

17. Applicants have further contended that the language "*open*" (which is also unsupported by the original disclosure) means capable of allowing gas, but not liquid, to escape from the anode chamber (see the amendment of 09/01/04 at page 18, 2nd full paragraph). Nevertheless, no support for the particularized definition of the term "open" has been found throughout the original disclosure, in particular, at page 14 and Figure 6A. However, in order to address such limitation, it is contended that the electrolyte membrane of the prior art which allows carbon dioxide to pass from the anode aspect of the fuel cell to the cathode chamber meets the

requirement of being an open gaseous effluent release port. Moreover, applicants have also contended that "*the membrane electrolyte is not sufficiently permeable to carbon dioxide to allow for effective removal (or effective release) of the carbon dioxide product from the anode chamber*". In this respect, since the term "effective removal" or "effective release" is not defined in term of a specific flow rate or a quantitative mass measurement so as to ascertain the required degree of fluid removal, it is contended that the membrane electrolyte of the prior art is able to effectively remove gaseous effluent from the cathode aspect. To be precise, in the absence of a fairly-supported definition of what is meant by "effective removal" or what specific amount of gas or flow rate is intended by the term "effective removal", it is certainly asserted that the prior art's membrane electrolyte effectively removes anodically-generated gaseous effluent from the anode aspect.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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